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FEDERAL COMMUNICATIONS COMMISSION  
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In the Matter of )

)  
Amendment of Part 25 of the Commission's )  
Rules to Establish Rules and Policies )  
Pertaining to the Second Processing Round )  
of the Non-Voice, Non-Geostationary )  
Mobile Satellite Service )

IB Docket No. 96-220

To: The Commission

**REPLY OF FINAL ANALYSIS COMMUNICATION SERVICES, INC.**

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## **SUMMARY**

The record in this proceeding resolves almost all issues in the licensing of Non-Voice Non-Geostationary Mobile Satellite Service ("NVNG MSS") and provides the Commission a sound basis for licensing all second round applicants under existing qualification criteria.

Market studies submitted by Final Analysis and others demonstrate that new entrants should be licensed to ensure fully competitive NVNG MSS markets. The first round licensees, with one non-commercial and two commercial operators, form a concentrated market. Moreover, as confirmed by several commenters, the NVNG MSS market has diverse segments each with varying supply and demand characteristics. Not all operators will address all segments, and individual segments face different degrees and forms of competition and substitution from other terrestrial and satellite services. Thus, new entry is essential to ensure competition across the full range of services in the entire NVNG MSS market. Final Analysis questions whether reliance can be placed on possible foreign entry to provide the necessary competition, as there is no assurance as to whether or how such foreign entrants will compete in U.S. markets.

Most commenters agree that, because different NVNG MSS licensees and applicants propose to serve different markets in different ways, the Commission should maximize potential competitive benefits by licensing all qualified second round applicants. The record also supports the exclusion of first round licensees to serve the public interest.

Final Analysis urges recognition of the fact that authorization of new entry should aim to achieve "full and fair" competition. This requires that the Commission adopt policies, including spectrum assignments, that facilitate future competitive provision of near real time services. Market studies by Final Analysis and other commenters show that additional entry

in these services, for which there are no reasonably priced non-NVNG MSS alternatives, has high potential public benefits. Final Analysis disagrees with Leo One that such services can realistically be provided within existing spectrum. However, because implementation of NVNG MSS requires long lead times and implementation of such services is possible under different market plans, Final Analysis agrees that applicants such as Final Analysis should be licensed now for the provision of such services subject to spectrum availability.

Full and fair competition also means that NVNG MSS services must be affordable. In this respect, sharing criteria must not be unduly burdensome. Leo One USA has indicated acceptance of various sharing criteria, including unduly complex orbit propagation algorithms and interference avoidance procedures requiring frequency agile user terminal receivers, which Final Analysis believes may seriously undermine the cost competitiveness of NVNG MSS. Final Analysis and CTA both urge the Commission not to adopt unnecessarily costly sharing criteria and to rely, to the extent possible, on direct coordination between NVNG MSS licensees and affected government and private operators.

Several workable proposals have been advanced, including by Final Analysis, for adoption of acceptable band plans. Final Analysis urges that the Commission select a band plan that achieves the following explicit objectives: (i) avoidance of mutual exclusivity and authorization of as many new qualified second round applicants as possible; (ii) avoidance of spectrum warehousing; (iii) efficient assignment of currently available spectrum; and (iv) promotion of a fully competitive NVNG MSS market.

Further, Final Analysis urges the Commission to facilitate avoidance of mutual exclusivity by deeming the different spectrum bands to be "fungible" according the following standards, consistent with comments on the record: (i) sufficient dedicated feeder link

spectrum to support a full constellation (comparing small and large constellations), (ii) essentially the same number of channels as measured in kHz; and (iii) essentially equivalent global availability.

Final Analysis agrees that the band plan proposed by Leo One USA, based on the Commission's original proposal and consistent with comments of the other second round applicants, meets these standards. The plan would permit E-SAT to share spectrum with GE Starsys using spread spectrum technology in the CDMA mode. The other FDMA/TDMA second round applicants would be accommodated in two separate band segments, created through the combination of spectrum from the FCC's proposed Systems 1 and 3 into a new "System A" and redesignation of the FCC's System 2 as new "System B". Each of Systems A and B would have fungible technical characteristics and could accommodate one "large" constellation (20 satellites or more) requiring relatively high availability. Final Analysis and Leo One fit that description. CTA has indicated that viable market plans could be implemented for a small constellation (less than 20 satellites) in 40-80 kHz of spectrum. If CTA agrees to modify its proposal for a system of that design, it could share either or both of Systems A and B with Final Analysis and Leo One USA.

If the Commission adopts the Leo One USA band plan, it may, consistent with the Communications Act of 1934, as amended, and applicable caselaw, rely upon public interest factors for specific assignments. Final Analysis recommends the following public interest factors, consistent with applicable precedent: (i) efficiency of spectrum utilization (e.g., maintaining separate bands for large systems but permitting large and small systems to share where feasible); (ii) technical compatibility (e.g., consideration of whether specific proposed system designs are more compatible with particular frequency bands); (iii) implementation

schedules (e.g., whether a particular assignment will facilitate earlier introduction of service to the public) and (iv) cost factors (e.g., whether particular assignments may facilitate more economical introduction of service and avoid undue cost burdens that may be passed on to consumers).

Under these public interest factors, and on the basis of the existing record, assignments are clear. If the Commission adopts Leo One USA's proposal, Leo One USA should be assigned System B, which it maintains has somewhat greater capacity and 100% availability, at least in certain latitudes at certain times. As Leo One admits that achievement of near real time service would require use of its proposed "step" or "hop" frequency avoidance scheme, which Final Analysis believes will impose additional costs, the public would be better served by permitting Leo One USA to attempt implementation in the band with greater capacity. Final Analysis should be assigned System A (which Leo One has determined to have lesser capacity) on the basis that, due to its demonstrated substantial and existing technical developments in the 400-401 MHz downlink bands, it is best positioned to implement the required technology for coordination in that band and can implement a constellation in that band with lowest costs and the swiftest implementation schedule. For similar reasons, if the Commission adopts any of Final Analysis's proposed band plans, Final Analysis should be assigned downlinks in the 400-401 MHz band.

The record reveals a consensus that the Commission should not use auctions to license NVNG MSS. It is premature and unnecessary to decide to use such an approach in this proceeding until all possible means to resolve potential mutual exclusivity, of which the record indicates there are many, have been explored. Even if mutual exclusivity remains, the record supports reliance on comparative hearings instead of auctions. The global nature

of NVNG MSS simply makes auctions unsuitable, and their use in this context could mean the destruction of competitiveness and indefinite delay in implementation of service.

Commenters also strongly agree that more spectrum should be made available to existing NVNG MSS licensees and applicants from WRC-95 and WRC-97 allocations, without opening a third round. The record also indicates strong agreement that efficient use of spectrum can be achieved through use of the existing two-satellite financial qualification criterion, along with imposition of due diligence milestones. Stricter financial qualifications are not warranted by the nature of the service and are unnecessary given the many options available to the Commission for avoidance of mutual exclusivity. The record also supports a decision not to mandate radio location requirements to avoid imposition of unnecessary costs. Commenters also generally agree that exclusive arrangements with foreign countries should not be permitted.

Finally, Final Analysis disputes arguments by Leo One USA and CTA that it should be excluded from this licensing round under the Commission's proposed attribution rules due to its agreement with VITA. That agreement is a completely arms' length capacity sharing arrangement and can in no way reasonably be deemed either a "joint operating" or "joint marketing" agreement. There is no de jure or de facto control by either VITA or Final Analysis of the other. Exclusion of Final Analysis on this basis would only harm, rather than serve, the public interest through elimination of capacity to VITA for provision of vital humanitarian services. Final Analysis would simply terminate the agreement, as permitted by its terms.



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To: The Commission

**REPLY OF FINAL ANALYSIS COMMUNICATION SERVICES, INC.**

Final Analysis Communication Services, Inc. ("Final Analysis"), by its attorneys, hereby submits its reply comments in the above-captioned "Little LEO" proceeding to establish rules and policies for non-voice, non-geostationary mobile satellite service ("NVNG MSS"). As discussed herein, Final Analysis believes that a substantial record has been established to support reasonable and expeditious resolution of this proceeding. Final Analysis respectfully presents herein a recommended approach, consistent with the Commission's objectives and the comments of the other interested parties, that would facilitate the introduction, as soon as possible, of fully competitive NVNG MSS services in the public interest.

**I. INTRODUCTION**

Final Analysis believes that this proceeding has been extremely productive for the identification of potential solutions to the enormously complex spectrum and licensing issues involved in the second Little LEO processing round. Final Analysis commends the

Commission for the effort and care taken to develop creative and reasonable initial proposals, and likewise commends the commenters for the useful technical detail included in their pleadings. It appears that a solution may be close at hand. In assessing the record and reaching a final decision, Final Analysis urges the Commission to bear two important factors in mind.

The first is that NVNG MSS technology, and the exciting services it promises, are new and unique. NVNG MSS is different from any other service the Commission has ever licensed. This brings both promises and perils. The promises are that the technology, which is characterized by global mobile footprints, frequency agility, various frequency modulation and sharing capabilities, short service transmission bursts, and staged implementation of fully functional constellations over several years, makes possible innovative licensing and sharing approaches that could not be attempted in other services. The Commission already has recognized this in its proposal for time sharing, which Final Analysis and other commenters consider generally workable. Final Analysis urges the Commission to take full positive advantage of the uniqueness of NVNG MSS systems to license as many qualified second round entrants as possible.

However, the Commission should do so in a way that avoids potential perils. These include the need to avoid imposition of unnecessary costs on NVNG MSS systems whose public benefits and competitive advantages depend, in large measure, on maintaining low subscriber costs. Excessively elegant coordination criteria may vitiate the market benefits of this service. Another peril is that, due to the global nature of these systems and their reliance on foreign landing rights and licenses, use of auctions, while superficially attractive as a solution for U.S. licensing, could actually doom worldwide implementation of NVNG

MSS, including for U.S. customers. Finally, the staged implementation of NVNG MSS systems should be viewed as an advantage for consumers and not made a liability for licensees. The Commission should take a long view of this service, recognizing that long term public benefits in fully competitive NVNG MSS markets are best served by helping all of the qualified second round entrants, as well as the first round licensees, to be a success. The spectrum is so limited, the uncertainties are so great, and the time required for implementation is so long that the Commission should not look beyond the group of potential service providers presently before it. Indeed, the Commission must remain involved with this service, even after this licensing round is completed, to ensure that future spectrum is appropriately assigned to existing licenses for the most efficient full development of NVNG MSS.

The second major factor is that, with respect to the possible future allocation of additional spectrum for NVNG MSS, the interests of the NVNG MSS industry, including the second round applicants, and the U.S. government are intertwined. The record here demonstrates that to achieve fully competitive NVNG MSS markets including low cost near real time services, more spectrum is required. Over the past couple of years, Final Analysis has worked long and hard, designing systems, constructing facilities, conducting experimental tests, searching for and evaluating spectrum alternatives, working with foreign administrations, drafting working group papers, participating in U.S. preparatory meetings and serving as a delegate in international fora. Final Analysis has much more to contribute to the future U.S. efforts to gain global NVNG MSS allocations. In the context of an incrementally implemented service such as NVNG MSS, Final Analysis believes that it is appropriate in the public interest, and supported by the record, to give each of the NVNG

MSS licensees and applicants participating vigorously in such efforts an expectation of access to future spectrum to develop a fully competitive system. Such an approach may be critical to making the need for more spectrum a self-fulfilling prophecy.

## **II. THE RECORD IS COMPELLING THAT ADDITIONAL ENTRANTS MUST BE LICENSED TO CREATE COMPETITIVE NVNG MSS MARKETS**

### **A. The Commission Should Authorize New Competitors**

#### **1. Market Studies Show that NVNG Markets Are Not Currently Competitive**

##### **a. First Round Licensees Constitute a Concentrated Market**

Both Final Analysis and Leo One USA submitted extensive market analyses in the initial comment round of this proceeding. While Final Analysis's presentation was more qualitative and Leo One USA's more quantitative, both arrived at essentially the same result, namely that the NVNG MSS market is currently very concentrated and can be meaningfully made more competitive only with the authorization of more entrants.

It is clear that in the very near term the market will remain a monopoly, with ORBCOMM the only operative commercial supplier. In the long run, the market will at best be a duopoly.<sup>1</sup> VITA is a non-profit entity providing humanitarian services not in competition with the other commercial systems. Thus, the U.S. market will remain highly concentrated without additional entry.

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<sup>1</sup> Leo One USA, however, voices some skepticism that GE Starsys, the other licensed commercial entity, may not launch its authorized system.

**b. Different NVNG MSS Market Segments Have Diverse Characteristics**

As demonstrated in detail by the market analyses presented by Final Analysis and Leo One USA, there are several different segments in the NVNG MSS market. Each segment has diverse characteristics in terms of demand elasticities, competitive supply, and service substitutions. Final Analysis and Leo One USA essentially agree that the different segments are along a continuum from services requiring only intermittent availability and low throughput to those requiring near real time availability and high throughput.<sup>2</sup> Services on the "lower" end of this continuum already have many substitutes, including cellular, broadband PCS and specialized mobile radio service. Thus the markets for these services are already competitive to a degree. The entry of additional NVNG MSS operators will add additional customer options, such as global availability, as well as downward price pressure, and therefore will provide competitive benefits. Final Analysis agrees with assertions by CTA and E-SAT that there will be significant demand for these services, as long as they remain very cost competitive.

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<sup>2</sup> Leo One USA divides the identified NVNG MSS markets into three discrete segments that it believes second round Little LEO licensees are most likely to target. According to Leo One USA's analysis, the first segment -- near real time services -- comprises 32 percent of the identified NVNG MSS market and will be the primary target for new second round licensees because first round licensees do not have the ability to serve this market segment. The second market segment in Leo One USA's analysis -- services for which NVNG MSS provides a low-cost alternative -- comprises 17 percent of the total identified NVNG MSS market. The licensing of new Little LEO operators in the second round would introduce more competition in this segment to further drive down prices. The third market segment consists of services for which terrestrial substitutes to Little LEOs exist, and this segment comprises 44 percent of the identified NVNG MSS markets. Leo One USA believes that this segment would be the smallest source of revenue for Little LEO licensees, involving primarily "niche" sales. See Leo One USA Comments at 10, 15.

Although Final Analysis does not endorse Leo One USA's quantitative assessment of these market segments, it generally agrees with the following conclusions: (i) no NVNG MSS markets are sufficiently competitive now; (ii) competitive benefits will be experienced in all market segments with authorization of new entry and (iii) relatively greater competitive benefits will be experienced in market segments that require greater coverage and service availability. It has been Final Analysis's experience that as customers become more acquainted with NVNG MSS applications and capabilities, tolerance for service delays decreases and interest in greater availability increases. Thus, as NVNG MSS applications and markets mature, demand for greater coverage and availability is likely to increase.

## **2. Reliance Cannot be Placed on Foreign Entry**

ORBCOMM argues that the Commission cannot evaluate relative competitiveness of NVNG MSS markets without taking into account the possibility of implementation of foreign systems.<sup>3</sup> Final Analysis agrees that the potential entry of foreign systems into what is essentially a global market is an important consideration, in many respects. However, the impact of such entry on U.S. consumers, the appropriate focus of the Commission's interest in this proceeding, is too speculative to take into account. Although NVNG MSS systems are global in nature, many services offered will be national, or even local, in character. The extent to which foreign systems may plan to offer services in the U.S. domestic market, and the terms and conditions pursuant to which they would be permitted to do so, are uncertain. As the full technical characteristics and business plans of these systems are not known, they

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<sup>3</sup> See ORBCOMM Comments at 22-24.

cannot fairly be taken into account in any competitive market analysis that the Commission might undertake.

**B. The Commission Should License All Qualified Second Round Applicants**

**1. No Specific Number of Entrants Will Ensure Competition in Diverse NVNG MSS Market Segments**

The comments of the second round applicants clearly reveal different business plans. Final Analysis agrees with E-SAT<sup>4</sup> that it is important to recognize that each of the second round NVNG MSS applicants are different from one another, as well as from each of the first round licensees. As CTA has noted<sup>5</sup>, this diversity is just what a competitive market is supposed to be about.

Leo One USA has proposed a large constellation and has stated in its comments that it expects to earn most of its revenue in the fifth year of operation from near real time services, with most of the remainder earned from other Little LEO services with relatively high polling frequency. Leo One USA will participate in, but is not significantly targeting what it calls "niche" markets for intermittent services.

Final Analysis intends vigorously to pursue each potential market segment as full implementation of its constellation is incrementally achieved. Final Analysis does assume, however, that within the same time frame as estimated by Leo One USA, near real time services will constitute a very important market segment. Final Analysis will be poised and

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<sup>4</sup> E-SAT Comments at 19-20.

<sup>5</sup> CTA Comments at 14.

ready to pursue market opportunities for such services, again subject to the availability of suitable spectrum.<sup>6</sup>

E-SAT and CTA both appear to share a strategy different from that of either Final Analysis or Leo One USA. E-SAT has proposed a small constellation designed to serve a very specific market segment, namely low cost, time-insensitive data messaging applications such as remote meter reading. Similarly, while CTA has proposed a large constellation in its comments, it appears to favor a business plan for a small to medium system targeting low cost, higher latency service offerings such as remote utility meter reading (monthly) and tracking (daily or hourly).<sup>7</sup>

Each entrant in the NVNG MSS market plans a different system design for a different business plan. Promotion of competition in such a market involves more than just an evaluation of numbers of competitors. In fact, because there are so many NVNG MSS

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<sup>6</sup> Because of these uncertainties as to which spectrum might become available in the future, Final Analysis has designed frequency agile radios for its spacecraft. As the Commission is aware, in preparatory meetings for WRC-97 Final Analysis has proposed a broadband allocation approach for additional global allocations for NVNG MSS spectrum. Under this approach, different spectrum may be utilized in different regions, depending upon regional allocations. Final Analysis's spacecraft are designed to operate in such conditions by accepting uplink and selecting downlink frequencies in appropriate frequencies according to location. By incorporating this feature in its satellites now, Final Analysis will be well positioned to expeditiously implement service on frequencies that may be allocated in the future, without incurring additional design, development and construction costs. However, Final Analysis stresses that this frequency agility feature pertains only to its spacecraft. Terminals are designed to operate only on one frequency. This is essential to keeping the cost of terminals as low as possible and maximizing the competitiveness of the service. This approach is apparently markedly different from Leo One USA's approach which would require placing multiple receivers in terminals which would most likely increase the cost of terminals.

<sup>7</sup> CTA Comments at 14-15. This may reflect, at least in part, CTA's current financial condition. See ORBCOMM Comments at 36 n.64 (citing CTA SEC Form S-1, stating a need on CTA's part to raise additional financing).



submarkets with varying characteristics, it is impossible to arrive at any general conclusion that a particular overall number of NVNG MSS competitors is optimum. There may be a different optimum number for each market segment. Final Analysis and CTA agree that, rather than focusing on specific numbers, the Commission should focus on ensuring that maximum opportunities exist for the market to determine the best service approaches and level of competition.<sup>8</sup> Because the NVNG MSS market is new and includes many risks and uncertainties, and because each of the first round licensees and second round applicants proposes a slightly different strategy, it is unnecessary and probably unwise to limit the number of applicants out of this group.<sup>9</sup> To the contrary, it is critical to reduce barriers to entry.

Leo One USA advocates a more selective approach.<sup>10</sup> Specifically, Leo One USA maintains that the greatest competitive value will be assured through authorization of at least two new entrants prepared to offer near real time services. While Final Analysis agrees that these services provide maximum competitive value, and that Leo One USA and Final Analysis, as the only two applicants currently proposing such services, both should be licensed, Final Analysis does not agree that the other second round applicants should be excluded. First, as stated repeatedly herein, Final Analysis does not believe near real time service can be competitively provided with the current available spectrum. Second, Final

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<sup>8</sup> CTA Comments at 14.

<sup>9</sup> As discussed below, the most appropriate approach to avoidance of warehousing in NVNG MSS through the establishment of clear due diligence milestones.

<sup>10</sup> Leo One USA Comments at 35-37.

Analysis agrees with E-SAT and CTA, as Leo One USA itself has demonstrated,<sup>11</sup> that other markets characterized by higher latency also would benefit by competitive entry.

For these reasons, Final Analysis recommends that the Commission license all of the qualified new second round applicants. As demonstrated in Final Analysis's initial Comments, and herein, this is achievable.

## **2. First Round Licensees May Be Excluded From This Round To Serve The Public Interest**

To the extent that currently available spectrum is so limited that the Commission cannot both grant first round licensees the additional spectrum they seek and authorize new entrants, the public interest priority should be in authorizing new competitors. The record supports the exclusion of first round licensees from this second processing round for the purpose of achieving this objective.<sup>12</sup>

However, Final Analysis also acknowledges that in certain respects first round licensees will not be able to fully implement their proposed systems and be fully effective competitors unless and until they too can gain access to additional spectrum. In this regard, Final Analysis supports the adoption of policies that would permit first round licensees to gain access to the bands they have requested as long as additional spectrum allocated globally in the future to NVNG MSS is assigned to second round licensees first as may be required to implement fully competitive systems.

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<sup>11</sup> See E-SAT Comments at 19-20; CTA Comments at 14; Leo One USA Comments at 10-15.

<sup>12</sup> See CTA Comments at 2; Final Analysis Comments at 4-5; Leo One USA Comments at 5; but cf. E-SAT Comments at 16-17.

### **3. The Commission Should Not Consider a Third Round**

In any event, the Commission should not contemplate the opening of a third round for NVNG MSS applications unless and until all first and second round applicants have been assigned sufficient spectrum for full implementation of their originally proposed systems. Although it is more consistent with the public's interest in a diverse market for the Commission to authorize more rather than fewer new entrants, the Commission should not open a third processing round until all first and second round licensees have sufficient spectrum to be fully competitive.

As discussed, none of the second round licensees proposing near real time services will be able to be fully competitive without assignment of additional spectrum. Consequently, the Commission's first priority should be the authorization of new entrants to ensure some competition in many NVNG MSS market segments. The Commission's second priority should be to ensure that all first and second round licensees are fully and fairly competitive before any additional entry is contemplated.

There are significant lead times in the development of NVNG MSS systems. First round licensee ORBCOMM first filed its application in 1990<sup>13</sup> and as of this date has only two of its total 36 satellites in orbit. The second round applications were accepted in late 1994, and, assuming that licenses are granted in 1997, it will not be before 1999 that most second round licensees have their first two satellites in orbit. Full constellations will not be in orbit until close to the year 2002. Even though it will take several more years to get these systems in operation, so much significant progress has been made in market research and

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<sup>13</sup> See Application of Orbital Communications Corp., File No. 22-DSS-P-90(20), dated February 28, 1990.

system design that the policies that help existing proposed systems reach their full potential will ensure the swiftest possible delivery of NVNG MSS services and thus will best serve the public interest.

If the Commission were to wait until additional spectrum is made available at WRC-97 or subsequent conferences to authorize entrants to be competitive with first round licensees, the potential of a truly competitive market will be lost. The first round licensees will have irreversible first-to-market advantages and any effective competitive entry will be delayed for almost a decade. On the other hand, if the Commission proceeds with the authorization of second round entrants, but opens a third round if and when additional spectrum becomes available as a result of future WRCs, the critical competitive headstart gained by second round entrants could be lost. In that case, full competition in near real time markets would be further postponed for a minimum of 5 to 10 years as third round applicants gain licenses and put full constellations in place.

Also, it is most important to recognize that additional delays and uncertainties are incurred as a result of international coordination. For example, as ORBCOMM observes in its comments, it is now much more difficult for additional FDMA/TDMA Little LEO systems to operate in the 137-138 MHz band without also causing harmful interference to ORBCOMM because an additional 133 kHz of spectrum is occupied by the NOAA MetSATs (out of 422 kHz previously thought to be available to MSS).<sup>14</sup> Thus, the subsequent coordination with the U.S. government has reduced the ability of additional FDMA/TDMA or CDMA NNG satellite systems to share the limited spectrum that has been allocated for

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<sup>14</sup> See ORBCOMM Comments at 32-33.

NVNG MSS.<sup>15</sup> Similarly, coordination with planned foreign systems may reduce actual availability of assigned spectrum. Thus, until international coordination is completed, actual assignments and requirements for existing licensees will not be known.

Finally, it is also the case that Final Analysis has devoted substantial personnel and technical and monetary resources in preparation for WRC-97 to assist the U.S. government in gaining additional spectrum for NVNG MSS domestically and internationally. In contrast, no companies that are not currently applicants for NVNG MSS systems are participating in these activities.<sup>16</sup> Without any expectation that such spectrum may be made available to second round applicants, incentives will markedly decrease for Final Analysis and other current applicants to participation in such activities. This will diminish critical industry support for U.S. efforts and may reduce chances of success.

In summary, to best achieve full and fair competition in NVNG MSS markets, the Commission should adopt policies in this proceeding that permit licensing of as many of the qualified new second round applicants with as much spectrum as possible. However, it should be recognized that such an approach still only partially accomplishes the overall objective. Achievement of full and fair competition in NVNG MSS markets will be incremental. While the Commission should ensure that the potential is created now for earliest possible introduction of full competition across the complete range of NVNG MSS market segments, achievement of full competition in certain segments must await assignment of additional spectrum. The Commission should also adopt policies here that ensure that

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<sup>15</sup> See id.

<sup>16</sup> Final Analysis also notes that no potential third round applicants have yet appeared in this proceeding.

future spectrum for this service will be most efficiently utilized, through assignment to existing licensees rather than a third round.

### **III. NEW ENTRANTS MUST BE ABLE TO COMPETE FULLY AND FAIRLY**

#### **A. The Full Range of Services Includes "Near Real Time" Applications Though They Cannot Be Reached Under Current Spectrum Limitations**

It is clear that true near real time services require a level of coverage and availability that cannot be achieved within the spectrum currently available in this proceeding. Leo One USA defines "near real time" as a service with transmission gaps of less than 5 minutes.<sup>17</sup> However, near real time service under this definition requires upwards of 99% global availability.<sup>18</sup> In other words, a customer in a particular location must find a satellite available more than 99% of the time.

As described in detail in Final Analysis's initial comments<sup>19</sup> and as discussed further below, the level of availability required for near real time is impossible to achieve under the time sharing obligations proposed by the Commission in this proceeding, given reasonable assumptions regarding technical and cost conditions for such sharing. Based on inputs provided in the NPRM, Final Analysis calculates that maximum coverage will be approximately 65% of time on a global basis.<sup>20</sup> Leo One USA itself calculates a maximum

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<sup>17</sup> See Leo One USA Comments at 9 n.18.

<sup>18</sup> This is an average number, as actual coverage in any particular constellation is not necessarily even over the entire globe. Typically, there may be one or more "holes" or gaps in a constellation that cause a greater gap in service than average. These holes may traverse the globe in an irregular pattern.

<sup>19</sup> See Final Analysis Comments at 13-14 and Exhibits 1 and 2.

<sup>20</sup> Coverage will decrease at latitudes north of 45 degrees. See id.

coverage of 68%.<sup>21</sup> Thus, there is no way that any second round applicants authorized in this proceeding can provide any competitive benefits in near real time market segments operating under the Commission's spectrum proposal. This is true no matter how many operators are licensed, and would be true even if only one second round applicant were licensed.

Nonetheless, consideration of potential competitive benefits in near real time market segments is crucial to the realization of the full potential of NVNG MSS. As described above, this is the market segment in which public benefits of competitive entry are most significant, and Final Analysis believes that it will also prove to be one of the fastest growing segments. Both Leo One USA and Final Analysis have proposed systems intended to provide near real time services, along with services in other market segments, subject to spectrum availability. The process of obtaining authorization for, and constructing and launching full constellations required for such services, requires extremely long lead times.

The public interest would be best served by licensing Final Analysis now, enabling the company to begin implementation of its constellations and initiation of commercial applications permitted by currently available spectrum. As spectrum becomes available to support near real time services, those licensees that are interested in and capable of providing

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<sup>21</sup> See Leo One USA Comments Appendix E p.16. Leo One USA calculates this number as the result of overlaps of two NOAA satellites with a Leo One USA satellite, during one orbital period. Leo One USA assumes that if only one NOAA satellite is overlapping their terminals will hop frequencies. As discussed below, Final Analysis disagrees with the feasibility of this approach. Also, using only one orbital period (105 minutes) is not sufficient to model dynamic Little LEO systems accurately. At a minimum, a representative sample must cover a 24 hour period. Final Analysis's study, prepared by Autometric, considered outages for four 24 hour periods each separated by three months of one year in order to fully understand these dynamic conditions. Leo One's analysis is comparatively unsophisticated.

near real time services should be authorized to use it. Final Analysis urges the Commission to consider the critical future public benefits of the swift and efficient implementation of near real time services as an important rationale in authorizing new entrants in this round that include such services in their system design.

It is also important to recognize that the lack of ability to provide near real time services under current spectrum constraints will not hobble second round entrants from being effective competitors in market segments that they can serve. As the Final Analysis and Leo One USA market analyses have shown, and as CTA and E-SAT also have commented,<sup>22</sup> important consumer benefits will be achieved from entry in other intermittent markets. The phased-in implementation of NVNG MSS systems will permit second round licensees to enter the more intermittent markets as soon as one satellite is launched, and to build toward the completion of their business plans as more satellites are launched.

**B. "Fully Competitive" NVNG MSS Services Require That Sharing Criteria Be Affordable and Reasonable**

Even so, a second important factor in assessing competition in NVNG MSS markets is that to be "fully competitive," new entrants must not only be able to provide the full complement of services but also must be able to do so without additional cost burdens that may decrease the attractiveness of their offerings. In this sense authorization of new entrants, by itself, does not guarantee full and effective competition. A critical competitive factor for second round NVNG MSS licensees will be the inexpensiveness of service relative to terrestrial and other satellite options as well as to first round systems. Sharing criteria should minimize unnecessary cost burdens and other competitive disadvantages.

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<sup>22</sup>See CTA Comments at 8-11; E-SAT Comments at 19-20.



Final Analysis's detailed responses to the Commission's proposed sharing criteria<sup>23</sup> are supported by the record. However, Final Analysis believes it is important to underscore certain essential concepts regarding these sharing criteria and to place some comments by others, particularly Leo One USA, in the proper perspective.

First, Final Analysis recognizes the value of utilizing a time sharing regime to permit authorization of more entrants, and appreciates the Commission's efforts in devising this approach. However, in recognition of the fact that any time sharing obligations imposed on second round licensees places them at a competitive disadvantage vis-a-vis first round licensees, especially with respect to service applications requiring greater availability, such obligations should be implemented in a way that avoids placing undue additional burdens on NVNG MSS operators.

For example, as discussed above, Final Analysis and Leo One USA each has calculated the outages that would result under the Commission's time sharing proposal. Leo One USA argues that certain parameters given in the Notice, namely the 0 degree elevation angle for determining the exclusion zone in FCC System 2 between a Little LEO system and the NOAA satellite is too conservative, and instead uses a 5 degree elevation for the purpose of its analysis.<sup>24</sup> Under this approach, Leo One USA calculates availability in FCC System 2 as 77% (a 23% outage). Acknowledging that the elevation angle "directly impacts the Little LEO commercial service availability," Leo One USA calculates the

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<sup>23</sup> See Final Analysis Comments, Exhibit 2.

<sup>24</sup> Final Analysis and CTA agree that the 0 degree elevation requirement is unnecessarily stringent. See Final Analysis Comments, Exhibit 2 at p.8; CTA Comments at 26.